U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Urocitellus endemicus

Common Name:

Southern Idaho ground Squirrel

Lead region:

Region 1 (Pacific Region)

Information current as of:

04/01/2014

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status

___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species

___ Range is no longer a U.S. territory

___ Insufficient information exists on biological vulnerability and threats to support listing

___ Taxon mistakenly included in past notice of review

___ Taxon does not meet the definition of "species"

___ Taxon believed to be extinct

___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

Petition Information

___ Non-Petitioned

_X_ Petitioned - Date petition received: 01/29/2001

90-Day Positive:05/04/2004

12 Month Positive:05/04/2004

Did the Petition request a reclassification? **No**

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing? **Yes**

Explanation of why precluded:

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (http://endangered.fws.gov/) provides information on listing actions taken during the last 12 months.

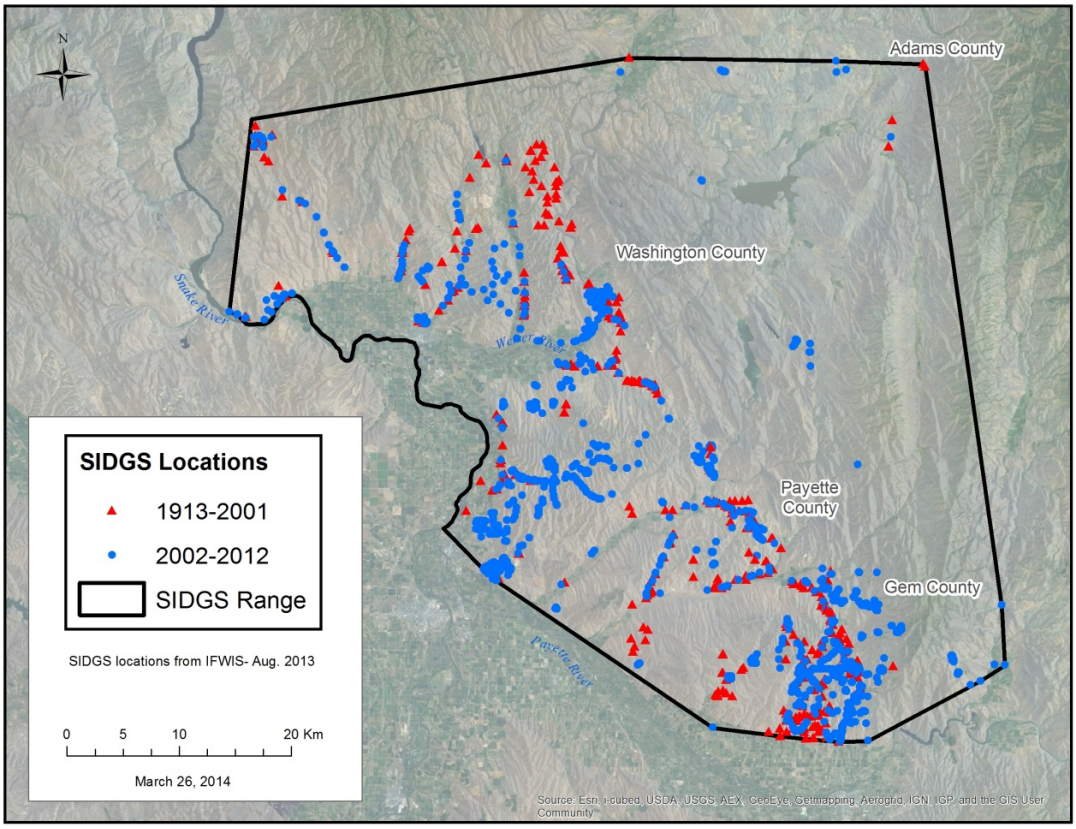
Historical States/Territories/Countries of Occurrence:

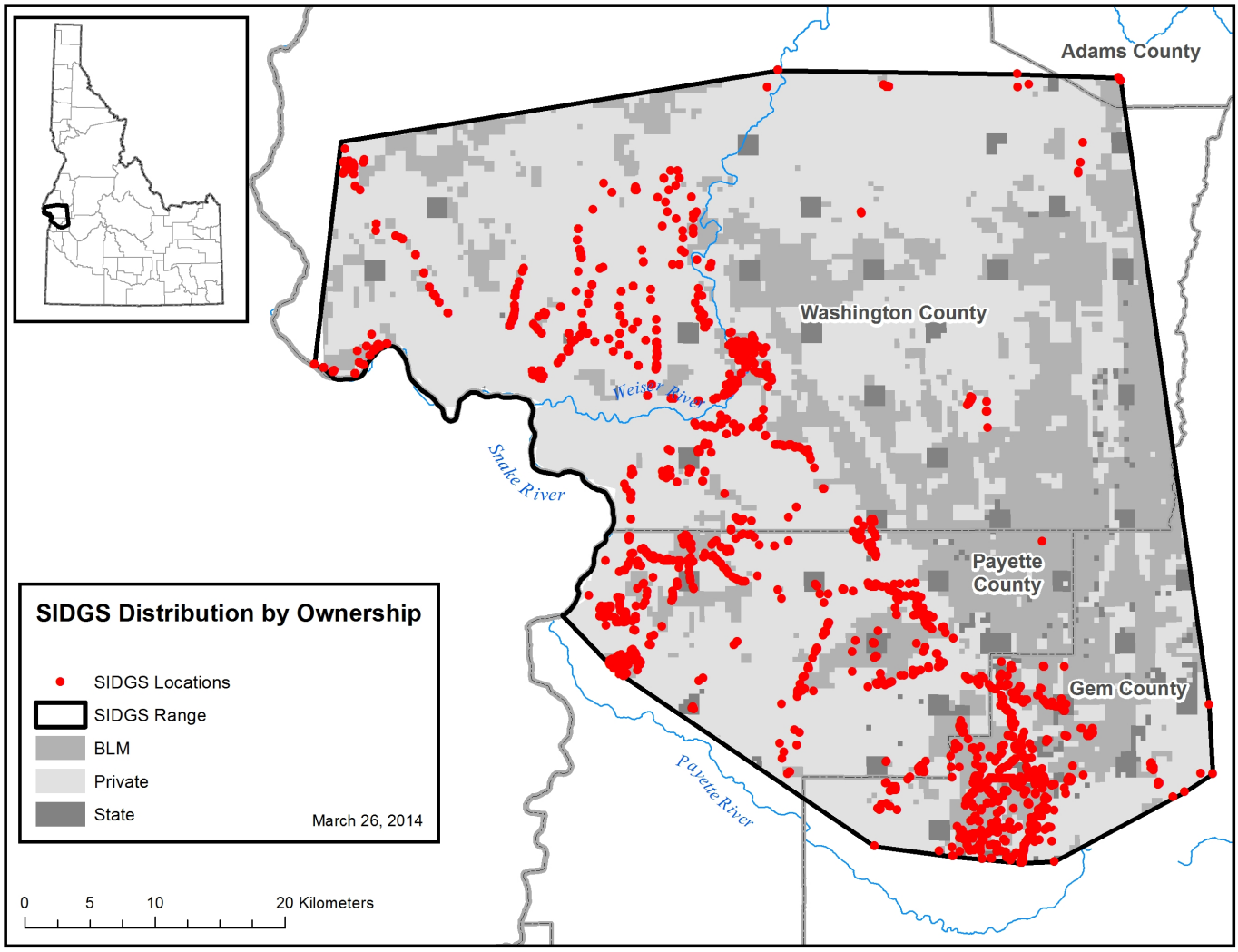
- **States/US Territories**: Idaho
- **US Counties**:County information not available
- **Countries**: United States

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: Idaho
- **US Counties**: Adams, ID, Gem, ID, Payette, ID, Washington, ID
- **Countries**:Country information not available

Land Ownership:


N
Adams County
Washington County
Payette County
Gem County
Snake River
Weiser River
Payette River
SIDGS Locations
1913-2001
2002-2012
SIDGS Range
SIDGS locations from IFWIS- Aug. 2013
0 5 10 20 Km
March 26, 2014
Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community



Land Ownership:

Southern Idaho ground squirrels, Urocitellus endemicus, are found in four counties in southwest Idaho (Fig 1.). Their geographic range (based on a minimum convex hull polygon) comprises 291,558 hectares (ha) (720,456 acres (ac)) of land owned by private entities (67 percent), the Bureau of Land Management (BLM) (29 percent), and the state of Idaho (4 percent) (USFWS, in litt. 2013a).

Lead Region Contact:

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Biological Information

Species Description:

The southern Idaho ground squirrel is a member of the small-eared group of ground squirrels. It has grayish-brown fur, light-colored speckles on its back, and rust-colored patches on its nose and legs. It is

approximately 237 millimeters (mm) (9 inches (in)) long including its short tail. (Yensen 1991, p. 596; Yensen and Sherman 1997, p. 1). The southern Idaho ground squirrel looks similar to other ground squirrels in Idaho, but can be differentiated from other species by technical details as well as their single-note whistle and geographic range (Yensen and Sherman 2003, p. 30; Lohr, in litt. 2013).

Taxonomy:

The southern Idaho ground squirrel, Urocitellus endemicus (formerly Spermophilus brunneus endemicus; Helgen et al. 2009, pp. 270-305; Hoisington-Lopez et al. 2012, pp. 589-604) was considered to be one of two subspecies (northern and southern) of the Idaho ground squirrel. However, based on differences in their geographic distribution, morphology, habitat (Yensen 1991, pp. 584-597), and genetic characteristics (Gill and Yensen 1992, p. 158; Hoisington-Lopez et al. 2012, pp. 595-599), the two subspecies are now considered distinct species.

Habitat/Life History:

Southern Idaho ground squirrels occur in the lower elevation shrub-steppe habitat of the lower Weiser and Payette River basins. Their habitat is typified by rolling hills, basins, and flats composed of lacustrine and fluvial sediments at elevations between 670 and 1,350 meters (m) (2,198-4,429 feet (ft)) (IFWIS, in litt. 2013). They inhabit an area historically dominated by big sagebrush (Artemisia tridentata), bitterbrush (Purshia tridentata), and bunchgrasses (Yensen 1991, p. 595). The big sagebrush-bunchgrass-forb complex has dramatically changed so that most of the native vegetation has been replaced by nonnative annual grasses, primarily cheatgrass (Bromus tectorum) and medusahead (Taeniatherum caput-medusae). Additionally, portions of the historical range were converted to agricultural land. Large-scale conversion is no longer occurring, but lands that were historically converted for agriculture continue to be used for that purpose.

Lohr et al. (2013, pp. 983-993) examined the influence of vegetation, soil texture, and topography on southern Idaho ground squirrel population densities, using burrow density as an index of squirrel density. They found that high burrow densities were associated with soil having a greater proportion of silt, east-facing aspects, greater cover of perennial grasses and native perennial forbs, and greater plant species diversity. Low burrow densities were associated with south-facing aspects, sandier soils, and a greater percentage of nonnative annual plant cover.

The southern Idaho ground squirrel is a semi-fossorial mammal and constructs two types of burrows: auxiliary and nest (Yensen et al. 1991, pp. 95-97; Lohr et al. 2013, p. 986). Nest burrows are used by females to rear young and by both sexes for sleeping and hibernating, although southern Idaho ground squirrels may also construct burrows specifically for hibernation (Yensen et al. 1991, p. 98). Burrow depth has not been thoroughly investigated for southern Idaho ground squirrels, although Yensen (in litt. 2013a) found one nest burrow to be 1.4 m (4.5 ft) deep. The nest burrows of northern Idaho ground squirrels extend 32 to 113 centimeters (cm) (13-45 in) underground into soils greater than 1 m in depth (Yensen et al. 1991, p. 98). In areas lacking persistent snow cover, nest burrows need to be located below the frost line for hibernation (Wagner and Drickhamer 2004, p. 194). Based on burrow information for northern Idaho ground squirrels, southern Idaho ground squirrels likely require a minimum soil depth of 1 m for constructing nest burrows. Southern Idaho ground squirrels spend most of their time underground in nest burrows. They are active above ground for approximately four months and spend the remaining eight months underground in a state of torpor (estivation and hibernation) (Yensen and Sherman 1997, p. 3). Adults typically emerge from their burrows in late January or early February (Yensen 1991, p. 593), depending on weather conditions and elevation. Males are the first to emerge from burrows; females emerge one to two weeks later and mate within days of emergence (Barrett 2005, p. 18). Litters of approximately seven young (Yensen and Sherman 1997, p. 3) are born roughly three weeks later and the young leave the burrow for the first time approximately 25 days after birth (Panek 2005, p.8). Immergence typically follows the same pattern as emergence with most adults and yearlings entering torpor by the end of May, followed by juveniles about one month later (Barrett 2005, pp. 32-33).

Southern Idaho ground squirrels are selective herbivores and are dependent on a subset of available plant species (Tarifa and Yensen 2004, p. 3). They primarily eat leaves of grasses and forbs in early- to mid-season and forbs (particularly forb seeds) late in their active season (Tarifa and Yensen 2004, p. 3).
Dispersal of individuals may play an important role in population dynamics and species persistence, especially through extended low population cycles. Juvenile dispersal in southern Idaho ground squirrels is male-biased with mean dispersal distances of male and female squirrels of 898 m and 526 m, respectively (Panek 2005, p. 32). Although most juvenile dispersal distances are less than 1 kilometer (km), Panek (2005, p. 32) observed one juvenile male travel 2.4 km. The potential for southern Idaho ground squirrels to move greater than 2 km and naturally recolonize previously occupied areas is unknown; however, Hoisington (2007, p. 68) documented the genetic exchange of material at distances up to 35 km (22 mi), likely in the result of a stepping-stone method rather than an individual squirrel traveling that distance in one lifetime.

Historical Range/Distribution:

The range of the southern Idaho ground squirrel comprises 291,558 ha (720,456 ac) in the four counties extending from Emmett, Idaho north to Midvale, Idaho: Adams, Gem, Payette, and Washington counties (Fig. 2). The range is bounded on the south by the Payette River, on the west by the Snake River, and on the northeast by lava flows with shallow soil (Yensen 1991, p. 595). Based on early records, specimen records, soil types and anecdotal observations, the historical distribution of squirrels likely included agricultural and urban areas adjacent to the Snake River, Weiser River, and south to the Payette River (Davis 1939, p. 185; Yensen 1980, p. 6; Yensen, in litt. 2013b). There have also been historical reports of southern Idaho ground squirrels in Goodrich and Indian Valley in Adams County, but squirrels were not found during surveys conducted in 1980 (Yensen 1980, p. 5). One landowner stated that squirrels were present in Indian Valley at least until the 1960s, but they were extirpated due to shooting and poisoning (Johnson 2013, pers. comm.). Two of the squirrels were shot by the landowners father and donated to the University of Montana. They are currently on loan to The College of Idaho. The last confirmed observation of southern Idaho ground squirrels in Adams County was in 1999 (Yensen 2001, p. 12; IFWIS, in litt. 2013a).

Current Range Distribution:

Since the southern Idaho ground squirrel was designated as a candidate in 2001, surveys have been conducted by biologists with the Idaho Department of Fish and Game (IDFG), BLM, and FWS almost every year. Currently, southern Idaho ground squirrels are found in Gem, Payette, and Washington Counties. The majority of squirrels are found in the southern portion of the range (Fig. 2).

Population Estimates/Status:

In 1980, surveys were conducted for southern Idaho ground squirrels in order to define their distribution; however, most of the surveys were in Washington and Payette counties, and only one area was surveyed in Gem County (Yensen 1980, pp. 2, 14-18). From these surveys, approximately 31 areas were identified as being occupied by squirrels. In general, Yensen described the populations as appearing widespread and abundant (1980, p. 8). Between 1985 and 2001, southern Idaho ground squirrel populations declined by an estimated 90 percent (Yensen 2001, pp. 2-3, 7). The population estimates were based on the number of active burrow entrances detected along transects, and extrapolating across the geographic range of the squirrel. Multiple studies on the relationship between the number of burrows and population sizes of similar ground squirrel species have indicated that burrow counts correlate generally, but not precisely, with ground squirrel densities (Powell et al. 1994, p. 365; Van Horne et al. 1997a, p. 100; Johnson and Collinge 2004, p. 492). Regardless, an apparent significant decline in the population occurred between 1985 and 2001 based on surveys and anecdotal observations (Yensen 1999, p. 9).
A 1999 survey of 145 of the 180 known historical population sites indicated that only 53 sites (37 percent) were still occupied (Yensen 1999, p. 6). Additionally, the percentage of active sites decreased from south to

north: 58 percent of sites in Gem County were occupied, followed by Payette County (46%), Washington County (27%), and Adams County (0%) (Yensen 1999, p. 6). Furthermore, at many of these sites, few or no squirrels were observed (Yensen 1999, p. 6).

In 2011, 89 of the 145 sites surveyed in 1999, which included sites surveyed in 1980, were resurveyed for occupancy (IDFG 2011, pp. 6, 10-11). Forty-seven sites (36 in 1999 and all 47 in 1980) were occupied and 42 (53 in 1999 and 0 in 1980) were unoccupied. This suggests an increase in distribution between 1999 and 2011. However, 33 sites (37%) historically occupied were not occupied in either 1999 or 2011, many of which are in the northern portion of the range. Because of the decrease in sites in the northern portion of the range, and because survey efforts previously had been focused in the southern portion of the range, IDFG concentrated on surveying sites north of the Weiser River in Washington County in 2013.

In 2013, IDFG surveyed 33 areas of historical occupancy by southern Idaho ground squirrels in the northern portion of the range. Eight of these historically occupied areas were unable to be surveyed because of access limitations. However, biologists detected squirrels at 16 of the remaining 25 sites they were able to survey. They also detected squirrels at 50 new point locations (IDFG 2013, p. 5).
Southern Idaho ground squirrels were intensively surveyed at five study sites between 2002 and 2012 to obtain population estimates and as part of research projects. Squirrels at the five study sites were captured and ear-tagged within a 1-ha plot to obtain population estimates using mark-recapture techniques from 2007 to 2012 (Table 1).

Table 1. Results from the IDFG mark-recapture study (IDFG 2012, pp. 7-8). Southern Idaho ground squirrels were trapped at five study sites from 2007-2011 and four study sites in 2012. Population estimates were derived using Lincoln-Petersen estimates. M = male, F = female.

Year	Total Number Captured (M, F)	Population Estimate
2007	131 (57, 74)	186
2008	91 (30, 61)	164
2009	132 (60, 71)	184
2010	121 (43, 78)	176
2011	125 (33, 92)	234
2012*	86 (45, 41)*	116*

*2012 data do not include the Clay Peak study site; therefore, total numbers captured and population estimates are not comparable between 2012 and prior years.

Monitoring at long-term intensive population sites from 2007 to 2011 suggests that the populations may be stable. These monitoring sites may not be representative of the population throughout the range of the species, especially in the northern portion where sites are not monitored. However, we consider long-term monitoring sites, in combination with surveys of historically occupied sites, the best available indicators regarding the species population trend.

Distinct Population Segment(DPS):

N/A

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or

range:

Loss of natural habitats for southern Idaho ground squirrels has occurred from the conversion of sagebrush steppe habitat to agricultural fields; towns, roads, and associated infrastructure; and reservoirs. However, habitat degradation appears to be a leading factor affecting the long-term persistence of southern Idaho ground squirrels in their former native habitats (Yensen 1999, p. 12; Barrett 2005, pp. 63, 66, 73). The invasion of nonnative annual vegetation has changed plant communities and has altered the fire regime in a perpetuating cycle throughout much of the shrub-steppe habitat of southern Idaho (Whisenant 1990, p. 4). Cheatgrass and medusahead, which are nonnative annual grasses, are believed to have limited forage value to the squirrels, have highly variable annual productivity, and now dominate much of the squirrels range (Yensen 1999, pp. 10-11). The native perennial forb and grass diversity decreases in areas where these nonnatives occur and limits the dietary diversity available to ground squirrels (Yensen 1999, p. 11; Tarifa and Yensen 2004, pp. 13, 22). Without the stable and nutritious diet provided by native perennial grasses and forbs, southern Idaho ground squirrels must rely on nonnative annuals, which have highly variable productivity rates and a lower nutritional value. In years of low rainfall, low productivity of nonnative annual vegetation could prevent squirrels from storing enough fat to successfully overwinter and reproduce the following spring.

Research indicates that higher densities of southern Idaho ground squirrels occur in areas where a native component of vegetation still exists (Lohr et al. 2013, pp. 988-989). Barrett (2005, p. 53) observed that variation in body condition at emergence was greater at sites with a higher abundance of nonnative, invasive grasses, and lower at sites with a higher abundance of forb species. Burrow density is negatively correlated with nonnative annual vegetation (Lohr et al. 2013, pp. 988-989). Additionally, a negative correlation existed between the predicted persistence rate of southern Idaho ground squirrels and nonnative grasses (Barrett 2005, p. 57). This finding suggests that ground squirrel populations that occupy habitats composed of higher levels of nonnative annual grasses may have lower reproductive and survival rates, particularly during years of low precipitation.

While most of the negative effects of habitat degradation are thought to be caused directly by changes in food resources available to southern Idaho ground squirrels, negative effects may also be partially due to changes in the physical environment. Sharpe and Van Horne (1999, pp. 275-276) found that Piute ground squirrels (Urocitellus mollis) in sagebrush habitat could remain above ground, foraging beneath sagebrush, when ambient temperatures exceeded 25 degrees Celsius (77 degrees Fahrenheit). In contrast, squirrels in habitats dominated by nonnative annual grasses retreated to burrows, potentially reducing the amount of available foraging time. Van Horne et al. (1997b, p. 313) suggested that shade from sagebrush may reduce the drying effects of sun and result in more succulent vegetation beneath shrubs. A reduction in foraging time or forage availability (from senescence) could result in reduced fat accumulation by ground squirrels, and may contribute to reduced overwinter survival.

Despite the widespread degradation of native sagebrush steppe habitat within the species range, some human-altered landscapes that are irrigated, such as golf courses and cropland, have the potential to provide squirrels with a persistent food source during droughts. However, these same areas can have a negative effect on squirrels when they are indirectly killed by poisons during pocket-gopher control operations, and directly killed through shooting and poisoning when control permits are issued to landowners by IDFG because of crop depredation by southern Idaho ground squirrels.

Energy Development

A variety of energy development projects (hydroelectric, nuclear, geothermal, and oil and gas) have been proposed or initiated in the range of the southern Idaho ground squirrel. The potential construction of Galloway dam on the Weiser River may result in the inundation of approximately one to two percent of the habitat currently occupied by squirrels. Geothermal development has occurred in limited areas in the northern portion of the range. A nuclear power plant has been proposed in Payette County in an area occupied by southern Idaho ground squirrels, and oil and gas exploration and drilling has been initiated on a small-scale in Payette County and proposed in Gem County. At this time, we are unclear of the extent to which oil and gas drilling may affect southern Idaho ground squirrels.

Conclusion for Factor A
Based on our evaluation of the on-going risk to southern Idaho ground squirrels from habitat modification resulting from invasion of annual, nonnative vegetation, and the potential risk from oil and gas exploration, we conclude that this species is threatened by the present and threatened destruction, modification, or curtailment of its habitat and range.

B. Overutilization for commercial, recreational, scientific, or educational purposes:

Recreational shooting has been a source of mortality in some areas (Haak, in litt. 2010; IDFG 2011, pp. 11, 15), but State and Federal mechanisms to limit recreational shooting have been effective at protecting the southern Idaho ground squirrel (see State, under Factor D, for more information on these mechanisms). It is estimated that fewer than 100 southern Idaho ground squirrels have been collected during a 30-year period for scientific and taxonomic study (Yensen, in litt. 2007; Romin, in litt. 2013) (see Research, under Conservation Measures Planned or Implemented, for more information). Therefore, scientific collection is not considered a significant factor in their overall decline and is not considered a current threat.

Conclusion for Factor B
In summary, overutilization for commercial, recreational, scientific, or educational purposes is not likely having a significant impact to the species. Therefore, this threat is currently of low magnitude.

C. Disease or predation:

Disease has been suggested as potentially contributing to the decline of southern Idaho ground squirrels (Yensen 1999, p. 12) but no diseases have been documented (Yensen et al. 1996, p. 244). Plague (Yersinia pestis), a contagious bacterial disease found in rodents, has not been found in southern Idaho ground squirrels (Yensen et al. 1996, p. 244). However, this disease is of particular concern since it could significantly affect squirrel populations throughout their range. Given that this threat has not been manifested, it is non-imminent.
Southern Idaho ground squirrels are a prey species; therefore, predation is expected to occur. However, predators can affect some populations that are at critically low numbers. Predators include the red-tailed hawk (Buteo jamaicensis), prairie falcon (Falco mexicanus), northern harrier (Circus cyaneus), badger (Taxidea taxus), long-tailed weasel (Mustela frenata), and gopher snake (Pituophis catenifer) (Yensen and Sherman 1997, p. 3). In general, the threat to the species from predation is not known to be of significant magnitude at this time.

Conclusion for Factor C
In summary, disease is not known to have affected southern Idaho ground squirrels in the past, and the likelihood of disease affecting them in the future is unknown. Therefore, this threat is currently of unknown magnitude and is non-imminent. Predation does not appear to be significantly affecting any populations of southern Idaho ground squirrels. However, some level of predation is occurring, and is therefore considered imminent. The magnitude of this threat is unknown, but likely low.

D. The inadequacy of existing regulatory mechanisms:

Federal
Prior to 2000, the BLM did not have regulatory mechanisms in place for southern Idaho ground squirrels. The BLM now includes southern Idaho ground squirrel conservation measures in their Resource and Fire Management Plan updates for the Weiser Basin. The BLM is currently updating the Four Rivers Field Office Resource Management Plan, which includes the entire occupied southern Idaho ground squirrel range on Federal land, and is expected to consider land use impacts to the species as if it were listed as threatened. The draft Resource Management Plan has not yet been released for review. Additionally, the BLM provided funding for presence/absence surveys on BLM lands from 2000 to 2010 (Yensen 2000, p. 6; Yensen and

Haak 2000, p. 2; Warner 2003, p. 4; Holderman, pers. comm. 2007; IDFG 2009, pp. 11-12; IDFG 2010, p. 12-13) and has also provided funding for several graduate studies.

The U.S. Fish and Wildlife Service (FWS) has notified State and Federal agencies regarding the status of the southern Idaho ground squirrel; resulting in increased consideration for the species when Federal actions are taken that may affect the species. The FWS also conferences with the Environmental Protection Agency, BLM, and Natural Resources Conservation Service (NRCS) concerning the use of zinc phosphide (a chemical used to control rodents on public lands), and other chemical applications that may affect southern Idaho ground squirrels. These interactions frequently result in chemical use being subject to conditions and restrictions in those counties where the southern Idaho ground squirrel is found. The FWS has worked with the Federal Animal and Plant Health Inspection Service and Idaho State Department of Agriculture to minimize potential effects to southern Idaho ground squirrels from their annual insect control operations. The Federal Animal and Plant Health Inspection Service and Idaho State Department of Agriculture agreed to implement measures that would minimize the potential exposure of southern Idaho ground squirrels to harmful insect control chemicals.

State

The southern Idaho ground squirrel is identified as a Species of Greatest Conservation Need in Idahos Comprehensive Wildlife Conservation Strategy (IDFG 2005, App. B, p. 7) and is ranked as critically imperiled (S1) by the State. The State of Idaho classifies this species as a Protected Nongame Species (Idaho Administration Procedures Act 13.01.06). No open seasons are set on Protected Nongame Species, and shooting, trapping, poisoning, or possession is subject to IDFG approval of a permit. Reporting of permitted activities is required, and permits may not be renewed for applicants who have failed to submit these reports. Beginning in 2004, the IDFG has issued permits to control southern Idaho ground squirrels in response to depredation and damage claims by private landowners and golf courses (IDFG, in litt. 2009a and 2009b). Methods of control have included live trapping and translocation, as well as lethal removal by use of poisons and shooting. Control permits are only issued to address significant landowner concerns when populations are high. Control has been a regular occurrence during the recent high population cycle, especially from 2009 to 2013.

Although southern Idaho ground squirrels are not allowed to be killed without a permit, illegal recreational shooting has occurred in the past. In 2003, the IDFG initiated a public awareness program by including a one-page notice in their Upland Game regulations booklet warning against shooting of protected species of ground squirrels. This notice continues to be published annually. In addition, since 2004, the FWS, IDFG, BLM, and some private landowners have distributed, posted, and maintained Dont Shoot posters.
Idaho Department of Fish and Game has continued outreach efforts and law enforcement patrols (147 hours in 2010, 151 hours in 2011, 199 hours in 2012, 166 hours in 2013) to address recreational shooting of the species (IDFG 2011, pp.15-16; IDFG 2012, p. 8; Justus, in litt. 2014). These efforts resulted in a substantial reduction in violations detected from 2010 to 2013 (24 violations in 2010, three in 2011, and zero in 2012 and 2013 for illegal take).

Private

There are five private landowners currently enrolled in the programmatic Candidate Conservation Agreement with Assurances (CCAA) and one pending enrollment comprising approximately 38,101 ha (94,150 ac) within the range of the southern Idaho ground squirrel. The CCAAs require landowners to protect squirrels from illegal recreational shooting by posting No Shooting signs on their property or verbally warning people they encounter on their property. Additionally, landowners are required to make an effort to protect squirrels during their farming activities.

Conclusion for Factor D

In summary, sufficient existing regulatory mechanisms are in place to allow for effective conservation of

southern Idaho ground squirrels, given our knowledge of their current status and threats. We consider this threat to be low in magnitude and non-imminent.

E. Other natural or manmade factors affecting its continued existence:

Control

Ground squirrels are still considered pests by some private landowners (Prescott and Yensen 1999, p. 11). Southern Idaho ground squirrels often occur near agricultural fields resulting in localized crop losses during years of high squirrel populations (Prescott and Yensen 1999, p. 11). Yensen (1998, p. 6) speculated that the use of pesticides associated with crop production and insect infestation may have been a factor in the historical decline of this species. Efforts to control ground squirrel populations are frequently undertaken regardless of species and most often include shooting or poisoning (Sparber 2004, pers. comm.; Holderman 2005, pers. comm.). USDA-Wildlife Services has been made aware of concerns and coordinates control work of rodents to avoid southern Idaho ground squirrels.

Requests for lethal control of southern Idaho ground squirrels occur more often when squirrels are at relatively high densities. At high densities, lethal control may not have significant population effects; however, reducing the abundance of these populations may result in fewer individuals dispersing into nearby suitable habitats since dispersal may be density dependent (Aars and Ims 2000, p. 256; Matthysen 2005, p. 409). During high population cycles, dispersal of individuals may play an important role in population dynamics and species persistence, especially through extended low population cycles.

During years of high population cycles, the availability of squirrels for translocation far exceeds the agencies ability to live trap and translocate them. Trapping and translocating is a time-intensive effort that has yet to be more than marginally successful in establishing new populations. Therefore, despite the potential negative impacts to squirrel dispersal, control permits have been issued to private landowners.

Control actions for southern Idaho ground squirrels have occurred on the Scotch Pines Golf Course in Payette, Idaho, the Rolling Hills Golf Course and Hillcrest Cemetery in Weiser, Idaho, and on a few private ranches near Emmett and Payette, Idaho. IDFG issued six control permits in 2011 (USFWS, in litt. 2011) and seven control permits in 2012 (USFWS, in litt. 2012). At least 370 squirrels were shot in 2011 and over 1,000 squirrels were shot in 2012, and an unknown number were poisoned. The results of poisoning efforts are unquantifiable but likely resulted in hundreds of squirrels being killed in both years.

In summary, control actions are occurring where southern Idaho ground squirrel populations are locally abundant and overlap with areas of human use such as golf courses and agricultural fields. In some cases, these control actions may result in the loss of many individuals. However, the IDFG must issue a permit for all control actions, and these permits contain terms and conditions. Furthermore, the permits ensure that actions are only occurring where actual damage to human property is occurring and only when southern Idaho ground squirrel populations are known to be abundant. Despite substantial efforts, control is often recurring. In addition, these control actions are occurring in locations that represent artificial habitats for the species. We consider the threat associated with control actions to be imminent and ongoing but of a low magnitude because they only occur during periods of high abundance and in few locations.

Competition

Competition with Columbian ground squirrels (Urocitellus columbianus) may constitute a threat to southern Idaho ground squirrels in part of their range. The two species overlap in the northern and eastern portions of the southern Idaho ground squirrels range; north and east of the Weiser River in the northern part of the range, and north of the town of Sweet through the Ola-Sweet Valley in the eastern part of the range. Where the two species occur sympatrically, southern Idaho ground squirrels might be limited by interspecific competition with Columbian ground squirrels, similar to that observed between northern Idaho ground squirrels and Columbian ground squirrels (Moroz et al. 1995, p. 4; Yensen and Sherman 1997, p. 3), including competition for burrow sites (Haak 2000, p. 7) and food resources (Dyni and Yensen 1996, p. 107).

Because the geographic overlap between the two species is limited to occurrences in only the northeast portion of the southern Idaho ground squirrels range, the threat from competition with Columbian ground squirrels is non-imminent and of low magnitude.

Small Population Dynamics

In the early 1980s, southern Idaho ground squirrel populations were at a high cycle and were fairly widespread and continuous in their distribution (Yensen 1999, p. 4). By 2000, the population was at a low cycle and southern Idaho ground squirrels were found in relatively small, isolated populations. Small, isolated populations are susceptible to loss of viability associated with genetic drift and inbreeding (Lacy 1997, p. 321-331; Frankham 2003, p. 26). In 2002 and 2006, graduate students investigated the genetics of southern Idaho ground squirrels. In 2002, Garner (2004, p. 45) found low genetic diversity in all sampled populations of southern Idaho ground squirrels; however, populations in the central portion of the range remained genetically connected. Peripheral populations (those north of the Weiser River and on the eastern edge of the range) were more isolated and less genetically diverse than central populations. In 2006, Hoisington (2007, pp. 10, 19) assessed the change in squirrel genetics. From 2002 to 2006, she found that southern Idaho ground squirrel populations increased across their range and that the genetic diversity increased in the southern Idaho ground squirrel populations studied by Garner, suggesting more gene flow had occurred through dispersal and increased population sizes. Furthermore, based on genetic clusters, gene flow was occurring at distances up to 35 km (22 mi), likely in a stepping-stone method (Hoisington 2007, p. 68). However, most genetic clusters were separated by the Weiser River, which likely acts as a barrier to gene flow (Hoisington 2007, pp. 64-65). By 2012, southern Idaho ground squirrel populations were once again fairly widespread and continuous in their distribution, particularly in the southern portion of the range. Populations may still be relatively isolated and patchy in distribution in the northern portion of the range.

Climate Change

In the range of the southern Idaho ground squirrel, climate change is predicted to result in increased winter and spring precipitation followed by hotter and drier summers (NCADAC 2013, pp. 44, 56). Increased winter and spring precipitation could have a positive effect on squirrels by providing adequate forage during the breeding season. Conversely, hotter and drier summers could reduce the amount of forage available to squirrels, particularly in areas dominated by nonnative annual vegetation. Squirrels need adequate food resources to accumulate fat reserves for hibernation, thus increasing their likelihood of overwinter survival. For example, Van Horne et al. (1997b, p. 303) found that drought led to a significant decline of adult and juvenile Piute ground squirrels. Furthermore, drier conditions could also increase the frequency and severity of wildfires, thus facilitating the spread of nonnative annual grasses (Bradley et al. 2009, p.).

Conclusion for Factor E

Many of the remaining southern Idaho ground squirrel habitats and associated population sites are vulnerable to one or more manmade and naturally occurring threats. Actions to control southern Idaho ground squirrels in areas where they are causing damage to golf courses and private property are resulting in mortality. This threat is imminent, although the magnitude is considered low because it is only occurring in a small number of locations, and only under the guidance of an IDFG permit containing terms and conditions. Competition is believed to be of low magnitude and non-imminent since the overlap in distribution of competitors is small. Climate change has the potential to have both positive and negative effects on southern Idaho ground squirrels; therefore, we cannot determine the magnitude of the threat due to climate change at this time.

Conservation Measures Planned or Implemented :

Research

Since 2002, a total of six graduate students have conducted thesis work on southern Idaho ground squirrels in genetics, demographics, habitat, dispersal, and translocation methods (Garner 2004; Barrett 2005; Panek 2005; Hoisington 2007; Ross 2007; Busscher 2009). These research projects occurred on public and private land. The FWS, BLM, and IDFG provided funding to support all graduate research projects.

Zoo Boise collaborated with the FWS, IDFG, and Boise State University to build a propagation/research/ educational live exhibit for southern Idaho ground squirrels. A total of 31 southern Idaho ground squirrels were trapped from the Rolling Hills Golf Course and from several other population sites in 2002 and moved to Zoo Boise. This program proved to be a success with at least 24 young produced in the spring of 2003 (Panek 2005, p. 74) and every year thereafter. The effort to breed southern Idaho ground squirrels at Zoo Boise continues. From 2005-2007 and from 2010-2012, captive-bred southern Idaho ground squirrels were moved from Zoo Boise to suitable habitat on private and BLM land (Yensen and Tarifa 2012, p. 2). Current information suggests that new populations can be started through translocation; however, these efforts would be difficult and expensive and require multiple years of effort.

Candidate Conservation Agreements with Assurances

In 2002, a CCAA was approved with the Soulen Livestock Company (Soulen Livestock et al. 2002, entire) that provided for southern Idaho ground squirrel habitat conservation on approximately 17,402 ha (43,000 ac). In 2005, the FWS, IDFG, and the Idaho Governors Office of Species Conservation (OSC) completed and signed a programmatic CCAA covering all non-Federal land within the historical range of the species (approximately 425,630 ha or 1,051,752 ac). Under this programmatic CCAA, private landowners can enroll in the CCAA if they are willing to implement certain conservation measures on their property (IDFG et al. 2005, pp. 10-11).

Conservation measures of the CCAA include protecting southern Idaho ground squirrels and their habitat by minimizing ground disturbing activities, reducing recreational shooting and other direct killing, allowing for investigation of methods to restore currently degraded rangeland habitat on their lands by agency personnel, and allowing for translocation of squirrels to or from enrolled lands. In 2004 and 2005, the FWS provided funding to IDFG to hire a technician to survey private lands where five landowners had indicated they might participate in the programmatic CCAA. All five landowners enrolled in the programmatic CCAA upon its completion. In 2012, Soulen Livestock Company terminated their CCAA, but their enrollment in the programmatic CCAA will be completed in 2014. Once accomplished, the total land area covered by the programmatic CCAA will include approximately 38,101 ha (94,150 ac) within the range of the southern Idaho ground squirrel.

Surveys

The FWS has supported rangewide population surveys of southern Idaho ground squirrels during the past 25 years on public and private land. Surveys on private land associated with CCAAs have been funded by the FWS since 2002. In 2003, nine new southern Idaho ground squirrel sites were found on Soulen Livestock property. All of these new sites were in proximity to existing squirrel sites (Yensen 2003, p. 17). The BLM, in cooperation with the IDFG, conducted surveys for squirrels on BLM-managed lands from 2000 to 2010, to determine the location of active population sites of squirrels. No additional surveys have been conducted to date.

Translocations

Translocations of southern Idaho ground squirrels have been conducted for research purposes and as a non-lethal alternative to remove squirrels from areas where they are damaging agricultural crops. Eight southern Idaho ground squirrel translocations have been completed since 2001 (Yensen et al. 2011, p. 3-4). An additional two translocations have been in progress since 2012 (Yensen and Tarifa 2012, p. 2; Yensen, in litt. 2013c). Over 1,500 southern Idaho ground squirrels were captured from 2001 to 2012 and moved between 1 and 31 miles from capture locations to translocation sites (Yensen et al. 2011, pp. 3-4; USFWS, in litt. 2013b). Three translocation projects were designed to develop techniques to successfully supplement existing ground squirrel populations or establish populations where squirrels were no longer present either due to extirpation or through some natural causes such as normal expansion/reduction of range. Although research is on-going, preliminary results suggest that translocations are more successful when squirrels are

introduced into existing colonies. When translocating squirrels into unoccupied areas, survivorship is improved when squirrels are soft-released (i.e. held in a pen for a number of days and provided supplemental food prior to release) (Yensen et al. 2011, p.4).

Habitat Restoration

Restoration activities were identified to address the primary threat of habitat degradation. From 2003 to 2008, four small-scale habitat restoration projects, ranging in size from 0.4 ha (1ac) to 20 ha (50 ac), were initiated. All efforts subsequently failed to improve habitat conditions for squirrels either because of initial planning flaws (e.g. timing of planting, lack of site preparation) or because follow-up weed removal did not occur and the area was once again invaded by nonnative weed species. However, an additional 83 ha (205 ac) cheatgrass-dominated site near the Weiser River is being treated to reestablish the sagebrush steppe plant community. This project was divided into 3 phases: Phase 1 consists of 55 acres and restoration was begun in 2010, Phases II and III each consist of 75 acres and restoration was begun in 2011 and 2012, respectively.

Restoration for each phase involved multiple disking and herbicide treatments to reduce the weed seed bed. Phases II and III were planted with winter wheat for at least a season to further control annual weed species until native plants were seeded. To date, Phases I and II have been completed successfully; however, more time and money were required than was initially anticipated. Phase III will be assessed for weed species in 2014 and then either replanted with winter wheat for another year or seeded with native plant species.

On Federal land, there are two site-specific BLM projects that contain conservation measures designed to improve southern Idaho ground squirrel habitat: the Warm Springs Fire Emergency Stabilization and Rehabilitation Plan, and the Cherry Creek Fire Emergency Stabilization and Rehabilitation Plan. Both the Warm Springs and Cherry Creek areas burned in 2006 and habitat improvement and revegetation efforts were conducted. Aerial seeding after the Cherry Creek fire was only marginally successful; however, native perennial forbs and grasses successfully recolonized the site (BLM 2009, p. 3). For the Warm Springs area, drill seeding was marginally successful but aerial seeding was mostly unsuccessful (BLM 2010, p. 10).

Public Outreach

The FWS co-sponsored a symposium with other agencies and The College of Idaho on the Conservation Biology of Ground Squirrels and the Shrub-Steppe Ecosystem on March 30, 2001.

In 2003, the FWS and BLM funded the publication of Ground-Dwelling Squirrels of the Pacific Northwest by Eric Yensen and Paul Sherman. This field guide is used to educate the public about protected species of ground squirrels in the Pacific Northwest including the southern Idaho ground squirrel.

The FWS and IDFG have worked to design, produce, and post No Shooting signs to protect southern Idaho ground squirrels from recreational shooting. IDFG has written newspaper articles to inform the public about the biology and protected status of southern Idaho ground squirrels. IDFG hunter education instructors have maps of protected ground squirrels in the classrooms and emphasize that it is illegal to shoot protected ground squirrel species.

Summary of Threats :

Threats and/or sources of mortality to southern Idaho ground squirrels considered in this review include habitat degradation and fragmentation; direct killing from shooting, trapping or poisoning; predation; competition with Columbian ground squirrels; inadequacy of existing regulatory mechanisms; and other natural and human caused factors.

Habitat degradation is the primary threat to southern Idaho ground squirrels (Yensen 1999, p. 12; Barrett 2005, pp. 63, 66, 73). Nonnative annuals now dominate much of this species range, have changed the composition of vegetation, and have altered the fire regime in a perpetuating cycle (Whisenant 1990, pp. 4, 7, 9). While southern Idaho ground squirrels do eat cheatgrass (Tarifa and Yensen 2004, p. 20), it has highly variable annual productivity (Yensen et al. 1992, p. 309). In years of low rainfall, low productivity of these nonnatives could prevent squirrels from storing sufficient fat reserves to overwinter and exit hibernation in reproductive condition.

Additionally, energy development (oil and gas exploration, hydroelectric, nuclear, and geothermal development) could potentially have an impact on the amount and quality of habitat for southern Idaho ground squirrels. Currently, most energy development projects have been proposed and may be in some level of approval, or not implemented. We are aware that approximately three drill pads have been constructed in areas occupied by squirrels. At this time, we are unable to determine the magnitude of impacts from potential energy development projects.

Recreational shooting and other direct killing of southern Idaho ground squirrels is being regulated, monitored, and enforced. No studies have been conducted to determine the specific effects of these activities on ground squirrel populations, although it is likely that they have the potential to negatively impact squirrel dispersion.

Ground squirrels are sometimes considered pests by private landowners (Prescott and Yensen 1999, p. 11). When available, alfalfa and clover crops are one of the preferred food sources for southern Idaho ground squirrels, resulting in some crop loss in localized areas of squirrel abundance. Authorized control actions and trapping/translocation efforts in areas where local abundance is high results in a temporary decrease of the local population, but not the extermination of the population.

Predation is a potential threat factor but would only be a concern for populations that are already isolated and/or depressed. Competition with Columbian ground squirrels is a potential threat to populations in the northeast portion of the range, but it is not currently a substantial threat to the species due to limited overlap in their distributions.

Based on our evaluation of the ongoing risk to southern Idaho ground squirrels from habitat degradation resulting from invasion by nonnative annual vegetation, we conclude that there is sufficient information to develop a proposed listing rule for this species.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

Based on the information currently available on southern Idaho ground squirrels and the work either completed or in progress, we recommend the following conservation measures.

1. Support IDFG in the development of a rangewide conservation plan to refine the understanding of threats to southern Idaho ground squirrels and identify conservation actions to address threats to the species.
2. Pursue and implement effective means to restore native sagebrush steppe habitats and minimize or control nonnative plant species. Implement habitat restoration and management actions, prioritizing lands enrolled under the CCAA, when results suggest a reasonable likelihood of success.
3. Continue implementation of the programmatic rangewide CCAA completed in 2005 (IDFG et al. 2005) to address the primary threat of habitat degradation to the species. Consider additional landowners for participation in the CCAA to increase the area of land covered.
4. Consider pursuit of other CCAAs. The programmatic CCAA developed in 2005 was designed primarily for private lands being used for agriculture (farming or ranching). Other potential uses, such as golf courses, city parks, or utility corridors were not the primary target of the programmatic CCAA. Depending upon the

situation, different conservation actions/commitments may be needed for these lands.
5. Continue to work cooperatively with the BLM on management regimes, surveys, and habitat enhancement/restoration measures.
6. Continue development and management of occurrence records in IDFG database and consider methods for aggregating data into meaningful conservation units.
7. Conduct additional research and/or monitor the vegetation conditions across the species range to better determine the relationship between the species status and habitat conditions, including habitat treatments and implementation of broad-scale habitat management programs.
8. Continue efforts to educate the public about southern Idaho ground squirrels and enforce existing regulations to prevent illegal shooting activities. Continue and/or increase enforcement efforts, as necessary.
9. Work with CCAA enrollees and other agencies to quantify risks to southern Idaho ground squirrels from energy development projects.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8**
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Magnitude:

The primary threat to southern Idaho ground squirrels is habitat degradation. This threat remains constant because current methods of restoring native plants species are minimally successful, extremely expensive, and only currently feasible on a small scale. Although suitable habitat areas that can support southern Idaho ground squirrels still persist, many of these areas are dominated by nonnative annual grasses. Areas dominated by nonnative grasses provide less nutritional value (lower digestibility and early senescence) for southern Idaho ground squirrels, which in turn results in (1) variable body condition for all age classes, (2) suboptimal body condition for juveniles, and (3) reduced over-winter survival of juveniles (Barrett 2005, p. 73). However, in years of ample rainfall, productivity of nonnative annual vegetation is high, providing adequate food resources for squirrels. Therefore, the overall threat from habitat degradation is considered moderate.

Secondary threats to southern Idaho ground squirrels include illegal shooting, permitted lethal control, and climate change. Illegal shooting is being monitored and addressed with education and enforcement efforts.

The magnitude of this threat is considered low.

Southern Idaho ground squirrels are also being controlled to protect farm and other human activities from depredation impacts; these control actions are regulated by IDFG control permits and occur in a limited number of locations. We consider the magnitude of this threat to be low.

Climate change is predicted to result in milder winters, increased spring precipitation, and hotter and drier summers. These conditions would have potentially both positive and negative effects on squirrels. We are unable to predict the magnitude of this threat at this time.

In summary, based on the primary threat of habitat degradation, the magnitude of threats is moderate.

Imminence :

Threats from habitat degradation are ongoing, and many of the remaining southern Idaho ground squirrel habitats and associated population sites are vulnerable to one or more manmade and naturally occurring threats. The persistence of invasive nonnative plants and associated changes in fire frequency has made much of the remaining historical habitat less suitable for southern Idaho ground squirrels. Although provisions for habitat enhancement and restoration were included in the programmatic CCAA, successful implementation of restoration measures has not yet occurred. Some illegal shooting of southern Idaho ground squirrels continues, but is not considered a significant factor affecting the species. Therefore, threats to southern Idaho ground squirrels are considered imminent, primarily due to habitat degradation.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

Southern Idaho ground squirrels have been in a higher cycle of abundance recently resulting in a number of damage complaints from farmers and golf courses. Monitoring shows that the population may be stable. The BLM and several private landowners are willing participants in allowing surveys and intensive studies to be conducted on their lands. IDFG has taken swift action to minimize illegal shooting. The FWS concludes that emergency listing of this subspecies is not warranted at this time.

Description of Monitoring:

Monitoring at five study sites occurred from 2000 to 2012. The monitoring included trapping, weighing, sexing, and ear-tag marking squirrels to obtain population estimates. This intensive monitoring was conducted by biologists from IDFG and supported through Section 6 and USFWS Recovery Implementation and Candidate Conservation funds. BLM supervisors, biologists and GIS specialists have also cooperated and supported monitoring and survey efforts over time. Private landowners have allowed the IDFG and FWS to survey, monitor, and translocate squirrels on their property. Golf course managers and private landowners have allowed squirrel populations to be surveyed and individuals removed (via translocation) as necessary.

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Idaho

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

The IDFG maintains primary management responsibility for southern Idaho ground squirrels. IDFG coordinates an annual interagency technical meeting focused on conservation programs for this species. Since 2004, the FWS has annually provided funding to the IDFG to assist in monitoring efforts with this species. The FWS coordinates closely with IDFG technicians and biologists to address problems as they arise and cooperates to provide appropriate technical or financial support where necessary and available. In 2010, the FWS funded IDFG to compile all records and populate IDFG database records of southern Idaho ground squirrel sites, which was completed during 2011.
Additionally, staff from Idaho Department of Lands has met with FWS biologists to better understand the FWSs conservation approach and to integrate that approach into activities on State endowment lands.

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(USFWS) U.S. Fish and Wildlife Service. 2012. Email from Kristin Lohr, Wildlife Research Biologist (Idaho Department of Fish and Game) to Chris Reighn, Fish and Wildlife Biologist, (U.S. Fish and Wildlife Service, Boise, Idaho). Subject: summary of control permits issued for southern Idaho ground squirrel control by Idaho Department of Fish and Game during 2011. April 04, 2012.

(USFWS) U.S. Fish and Wildlife Service. 2013a. Calculation of SIDGS range and attributes based on a minimum hull convex polygon clipped along the Snake River. Spreadsheet and GIS project on file at Idaho Fish and Wildlife Office, Boise, Idaho.

(USFWS) U.S. Fish and Wildlife Service. 2013b. Compilation of translocation data from 2001-2012 in Excel spreadsheet.

Yensen, Eric. 2007. Professor, College of Idaho, Caldwell, Idaho. Subject: Comments on the 2005 Candidate Notice of Review for southern Idaho ground squirrels. February 07, 2007.

Yensen, Eric. 2013a. Professor, College of Idaho, Caldwell, Idaho. Subject: SIDGS CNOR. Comment made in SIDGS CNOR. April 11, 2013.

Yensen, Eric. 2013b. Professor, College of Idaho, Caldwell, Idaho. Subject: SIDGS CNOR. Email following up on reference in Yensen 1980 report. April 01, 2013.

Yensen, Eric. 2013c. Professor, College of Idaho, Caldwell, Idaho. Subject: SIDGS CNOR. Email dialogue following up on squirrel tranlocation project. April 11, 2013.

Personal Communications

Holderman, Jill. 2005. Biologist, Bureau of Land Management, Boise, Idaho. Subject: Thousand Springs contact and ground squirrel management. Dated April 21, 2005.

Holderman, Jill. 2007. Biologist, Bureau of Land Management, Boise, Idaho. Subject: Comments on the 2005 Candidate Notice of Review for southern Idaho ground squirrels. Dated February 8, 2007.

Johnson, L. 2013. Conversation between Lawrence Johnson, private landowner in Indian Valley, Adams County, Idaho, and Kristin Lohr, biologist (U.S. Fish and Wildlife Service, Boise, Idaho) via phone call. Subject: southern Idaho ground squirrels historically present in Indian Valley. April 1, 2013.

Sparber, Deb. 2004. Biologist, Idaho Department of Fish and Game, Nampa, Idaho. Subject: New land owner contacts and disposition toward southern Idaho ground squirrels. Dated April 14, 2004.

Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  06/18/2014
Date

Concur:  11/18/2014
Date

Did not concur: _____ _____
Date

Director's Remarks: